

March 9, 2006

Mr. Erwin Bucy
Vice President, Investments
Regency Centers
915 Wilshire Boulevard, Suite 220
Los Angeles, Ca 90017

Subject: Creek Stability Analysis for the Hitchcock Center Redevelopment Project

Dear Mr. Bucy:

Based my site visit January 17, 2006 and previously compiled data on the Arroyo Burro Watershed, I have prepared the following background information, site evaluation, and proposed conceptual creek rehabilitation plan for the Hitchcock Plaza redevelopment site.

Project Description

The proposed *State and Hitchcock Center Project* involves the redevelopment of approximately 3.54 acres of land located on upper State Street at the corner of State Street and Hitchcock Way. The project site is bound by State Street on the north, San Roque Creek on the south, Hitchcock Way on the east and Arroyo Burro Creek on the west. These creeks join immediately downstream of the site and continues as Arroyo Burro Creek.

The proposed development would involve construction of 4 (four) new, one- to three-story buildings on the project site. One of the structures will have a subterranean parking garage and a truck receiving area. Three-story townhouse style condominium units are proposed along the San Roque and Arroyo Burro Creek corridors.

The proposed building layout has been designed to provide a minimum 50-foot building setback from the 100-year flood elevation lines of San Roque and Arroyo Burro Creeks. Minor development encroachment into the proposed 50 foot structural setback area would occur along San Roque Creek and would consist of permeable materials associated with, a pedestrian path. Minor development encroachment into the proposed 50 foot structural setback area would occur along Arroyo Burro Creek and would consist primarily of permeable materials associated with a pedestrian path, the required fire access lane, and columns to support a vehicle ramp providing access to the roof-top parking above the commercial building.

Geomorphic Background

The project site is located within the Arroyo Burro Creek watershed. The creek flows about 7 miles south from its headwaters in the Santa Ynez Mountains, at an elevation of 3,800 feet mean sea level (MSL), until it discharges into a small tidal estuary at Arroyo Burro Beach County Park (Hendry's Beach). Tributaries to Arroyo Burro Creek include Las Positas Creek, Barger Creek, San Roque Creek, and Lauro Canyon Creek. A small, tidally influenced lagoon is present at the end of the creek at Arroyo Burro Beach. The upper portions of the creek traverse rural estates and orchards, while the middle portions of the creek pass through dense residential and commercial development between Foothill Road and Highway 101. Downstream of Highway 101, the creek traverses a mixture of residential areas and open space. The watershed drains approximately 5,600 acres of land.

Two main tributaries to Arroyo Burro Creek in the upper watershed include San Roque Creek, which forms an east branch, and Arroyo Burro Creek, located in Barger Canyon to the west of the main stem. Barger Canyon constitutes about 15% of the overall watershed (840 acres), while San Roque Creek constitutes about 48% of the overall watershed (2,688 acres). Upper reaches of the watershed are dominated by mixed chaparral open space, while the middle watershed runs through low-density residential areas. Most reaches have moderately vegetated banks, cobble and sand substrate, while portions of Arroyo Burro have been channelized north of Highway 101. Bank instability is a significant problem in middle and lower Arroyo Burro. Based on review of existing channel geomorphic conditions, our general observations are that the Arroyo Burro reaches are susceptible to bank failure by hydraulic toe scour and undercutting of over-steepened banks, as well as more deep-seated geotechnical causes.

The existing bank erosion sites occurring throughout Arroyo Burro and San Roque Creeks may indicate that isolated installations of hard channel revetment have had upstream and downstream impacts on other channel segments.

Fisheries

The following description of local fisheries resources in the project site and adjacent areas is summarized from the draft existing creek conditions study previously prepared by Questa.

Upper Arroyo Burro (Upstream of San Roque Creek). Upstream of San Roque Creek, Arroyo Burro is a small tributary that can dry out by mid summer. Habitat conditions are poor to fair with high substrate embeddedness and apparent lack of adequate summer flow and pool habitat. This reach of Arroyo Burro has not been extensively surveyed, but does not appear to contain significant habitat value for potential future salmonid restoration.

San Roque Creek. San Roque Creek is the primary headwater tributary of the Arroyo Burro Watershed. Upstream of the Arroyo Burro confluence, San Roque Creek contains a higher percentage of cobbles and boulders and a reduction in fine silts and sand deposits. Trickling surface flows were still observed just upstream of Arroyo Burro in July 2001. Salmonid habitat conditions are fair in lower San Roque Creek. Surface flows become sporadic upstream of Hitchcock Street. Minimal riparian canopy cover occurs upstream of State Street where adjacent parking lots and development have constricted the stream channel with associated concrete bank revetment.

During 2001 surveys, summer surface flows were observed to occur from the Highway 192 Bridge upstream to the upper identified natural barrier within Rancho San Roque. Fair to good salmonid spawning and rearing habitat conditions were observed in this reach. Summer pool habitat occurs upstream of Highway 192 and larger boulders provide good in-stream cover.

To summarize, Arroyo Burro Creek has limited salmonid habitat above its confluence with San Roque Creek. San Roque Creek has degraded habitat but upper portions of the watershed have conditions that could support salmonids. Fisheries and fish passage need to be considered in potential restoration or stabilization plans for San Roque Creek.

Site Conditions

Urbanization has impacted both the creeks on site. **Figure 1** below illustrates the conceptual evaluation of the channel after channelization and urbanization. There are generally five stages of creek evolution in a degrading system (**Figure 1**). Urbanization confines creek channels, increases entrenchment and armors or stabilizes large portions of the creek banks. This has many interdependent impacts but generally it increases the entrenchment of the creeks and reduces bank erosion and sediment inputs locally. This typically leads to channel bed degradation. Typically, anthropogenic features such as culverts limit the amount of degradation potential in the urban creek systems.

The project site creek reaches are bounded by culverts at Hope Street, Hitchcock Way and State Street. **Figures 2** and **3** show the profiles of both creeks. Generally, I believe that both Arroyo Burro Creek and San Roque are in creek evolutionary stages III and IV respectively. We have addressed each channel individually.

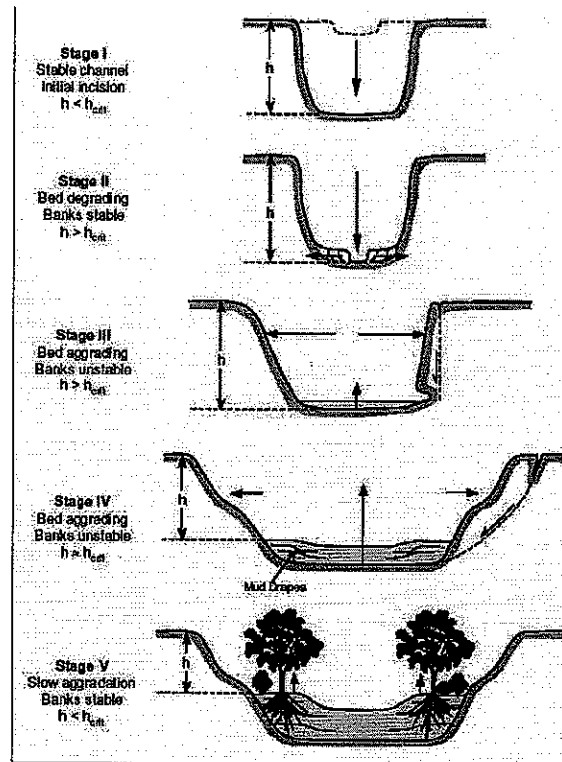


Figure 1. Schematic Urban Channel Evolution

San Roque Creek Bank Stability.

San Roque Creek appears to be in a later stage of evolution than Arroyo Burro Creek. It appears that most if not all of the potential degradation has occurred in the reach. Large boulders have been placed in the channel bottom at the upper end of the reach, which is likely to have a stabilizing factor. **Figure 3** shows that the stream bed profile in the lower reach is nearly flat and actually ponds low flow water. This is a clear indication that bed slope has stabilized and the reach is entering the fourth stage of channel evolution. The photos below show illustrate these points.



Photo 1. Low gradient reaches of San Roque Creek



Photo 2. Placed boulders for bed stabilization in upper San Roque Creek

The banks of San Roque are generally stable. There are isolated segments near the confluence, that have slumped and appear to have minor portions left to slide. These areas are outside of the building envelope and well within the setback limits. The existing concrete wall appears to be stable from bank retreat and I believe can be retained in the

project. A small area at the base of the gabions is starting to degrade. Here the gabion basket wire has been worn away and the bottom of the basket (s) have lost their integrity. This does not appear to be a major problem but the area should be monitored to address any problems before they become large stability issues.

San Roque Creek is in a later stage of its evolution and does not show significant signs of recent instabilities.



Photo 3. Base of gabions baskets showing broken bottoms – San Roque Creek

At present it appears that there is extensive root binding from the large eucalyptus trees. These trees will limit the revegetation effort due to shading and phytotoxic soil conditions. I would suggest removing these trees but retaining the stump and root structures. Newly cleared areas should be planted with riparian tree species.

As there are no channel bed or bank instability issues relating to San Roque Creek, I do not propose any improvements for this reach..

Arroyo Burro Creek Bank Stability.

Arroyo Burro creek is in an earlier stage of channel evolution and will continue to actively erode. The majority of this creek reach is dominated by sand and small gravel

bedload (material found deposited on the bed of the stream). Few large boulders were evident in the channel. Generally speaking, stable bed slope can be correlated with the size bed material in the channel. The coarser the bed material, the steeper the stable slope. For example; large 4 to 8 inch cobble bed rivers typically have slopes between 1 and 2.5 percent; sand bed or small gravel rivers typically have stable slopes within 0.2 and 0.5 percent or less.

Because the bed material in Arroyo Burro Creek is predominantly sand for much of the project reach (300 feet out of 500 feet), we can roughly assume a stable long-term slope of the channel would be in the 0.3 to 0.5 percent range. The current slope between the Hope Street culvert and State Street is approximately 2.46 percent. Figures 2 and 3 show what could be the potentially stable slope given data that we have and one representative cross section. It appears that channel will continue to degrade between 6 inches to 3.5 feet over the long term if the bed load composition remains the same. The largest amount of degradation is likely to be seen immediately below the State Street culvert outlet. There is strong evidence that this has occurred and/or is currently occurring in the system. The perching of the State Street culvert and the current placement of boulder revetment at the outlet are evidence of recent channel degradation. The photos below show signs of recent degradation in the channel.



Photo 4. Evidence of recent channel degradation below State Street culvert



Photo 5. Degradation at the pipe and wire revetment



Photo 6. Boulders placed at culvert outlet to stabilize degrading bed

The creek banks along Arroyo Burro Creek appear to be steep and stable in the short term. At present slopes are on average 1(H): 1(V). A typical natural semi-stable slope would be in the 1.5 (H): 1(V). As the channel continues to degrade the natural tendency for the channel is to widen its top of banks through slumps and geotechnical failures. **Photo 7** shows one of these failures occurring opposite the project site.



Photo 7. Bank failures in Arroyo Burro Creek, looking towards State Street

This erosion process will likely in time drive channel widening, potentially threatening the mature bank top oak trees and top of bank facilities. The existing pipe and wire revetment is aging and will eventually fail removing or reducing the toe support it is currently giving to the channel bank. Therefore it would not be infeasible that over time the bank top on the project site would retreat 10 feet from its present location if the bed elevation were to remain at its present location.

Arroyo Burro Stabilization Options

There are several potential options to address the channel bed and banks instability.

Option 1. No Action. This option would entail doing little or no work in the channel. It is likely that over time the top of bank will expand by a 10 to 15 feet. If this option is chosen I would recommend that 10 to 15 feet of additional setback for the buildings, roadways and other improvements.

Option 2. Armor the existing bed with larger immobile rock. This would stop or reduce current bed degradation but would leave the banks in their 1:1 configuration. Toe buttresses or other stabilization measures would be required so that little or no bank retreat would occur. Over time sand and small gravel would accumulate in the bed overlaying the armoring rock. The slope may continue to flatten through deposition. This reduction in slope could lead to increased lateral streambed migration leading to bank toe scour and potential bank failures. These failures would not likely impact any proposed building but could impact proposed storm drain and roadway infrastructure.

Option 3. Reestablish a stable steeper gradient. This option would entail recreating the previous 2 percent channel bed slope. This would be accomplished by placing dirt and rock fill material. The rock would be used to stabilize the channel bed. Reestablishing the historic grade would have several positive benefits. It would minimize top of slope retreat, reduce existing erosion, and reduce the potential for future geotechnical failures of the bank. This option is therefore the preferred stabilization option and is described in more detail below.

Proposed Rehabilitation Concept

The third option that would entail placing fill into the existing channel and recreating a ± 2 percent gradient in the channel for approximately 450 feet of the creek reach has been further developed. The steeper gradient would be stabilized by a series of 8, 1-ft high boulder grade control features spaced approximately 50 feet apart. **Figures 4 through 7** show this concept. This would entail placing up to five feet of fill in the channel bottom, roughly 800 to 900 yards of material and 800 tons of rock comprising of mixture of 1- and 2- ton rock with other diameter classes ranging from 16 to $\frac{3}{4}$ inches. The channel could be configured as a consistent slope then allowed to develop into low step pool morphology. Because fisheries resources are not critical, step pool height would comply with NOAA or CDFG criteria. Placing fill in the channel and reestablishing a channel will increase channel width, reducing flow depth and reducing channel scour forces. Wider channel width would also accommodate bank toe planting, and biotechnical stabilization techniques. Reestablishing a higher gradient creek would reduce its tendency to move laterally ensuring greater bank toe stability. Existing bank vegetation would be maintained to greatest extent possible. The existing pipe and wire revetment downstream of State Street would be removed and a planted boulder toe would replace it providing stability to the upper banks. I would propose exotic vegetation removal and the replanting with native riparian species.

Flood Control and Hydraulic Analysis

Currently, Arroyo Burro does not experience 100-year flooding in this portion of the channel. The project concept proposed above will only be feasible if the proposed project will not cause any new overbank flooding. In order to investigate this potential preliminary hydraulic analysis was conducted by Penfield and Smith. Penfield and Smith has just recently completed the restudy and delineation of the 100-year floodplain in Arroyo Burro for the Federal Emergency Management Agency (FEMA). Using previously compiled hydraulic models the project concept was evaluated to determine if the placement of fill in the channel would cause overbank flooding.

Based on their modeling the following conclusions were drawn;

- No increase in the 100-year flood elevation upstream of the state street culvert was caused by the proposed project

- 100-year water surfaces are increased downstream in the project area but at least 2 feet of freeboard is maintained between the water surface and the lowest top of bank elevation.
- A letter of flood plain map revision is possible with the support of the City and adjacent landowners.

I have attached the summary sheet of the Penfield and Smith's analysis to this letter.

SUMMARY

Arroyo Burro Creek and San Roque Creek are in different stages of channel evolution. San Roque Creek is in a later stage of evolution and appears to be in quasi-equilibrium with its urban/open space watershed. This channel is unlikely to experience significant future bed degradation and the amount of channel bank top widening is likely to be minor on the project side. Any channel widening that may occur is likely to be on the opposite bank (YMCA property side) where several small recent slumps or slides can be noted. Of some concern is the degradation of a small portion of the gabion baskets. The eucalyptus trees should be removed and native riparian tree species should be planted.

Arroyo Burro Creek bed appears to be actively in the process of degrading. This is causing over steepened bank slopes and will eventually lead to channel bank top widening. I have recommended a plan to address this evolutionary trend for Arroyo Burro Creek.

Rehabilitating and stabilizing the bed grade will reduce the potential for bank failure and widening of the channel. We believe that reestablishing the historical grade and placing grade control in the channel will provide viable long-term bed stabilization and reduce the threat of significant bank retreat. The reconstruction of the channel bed will increase flood elevation in the channel but this increase in levels are still within the bank tops and will not increase flood risk to adjacent properties.

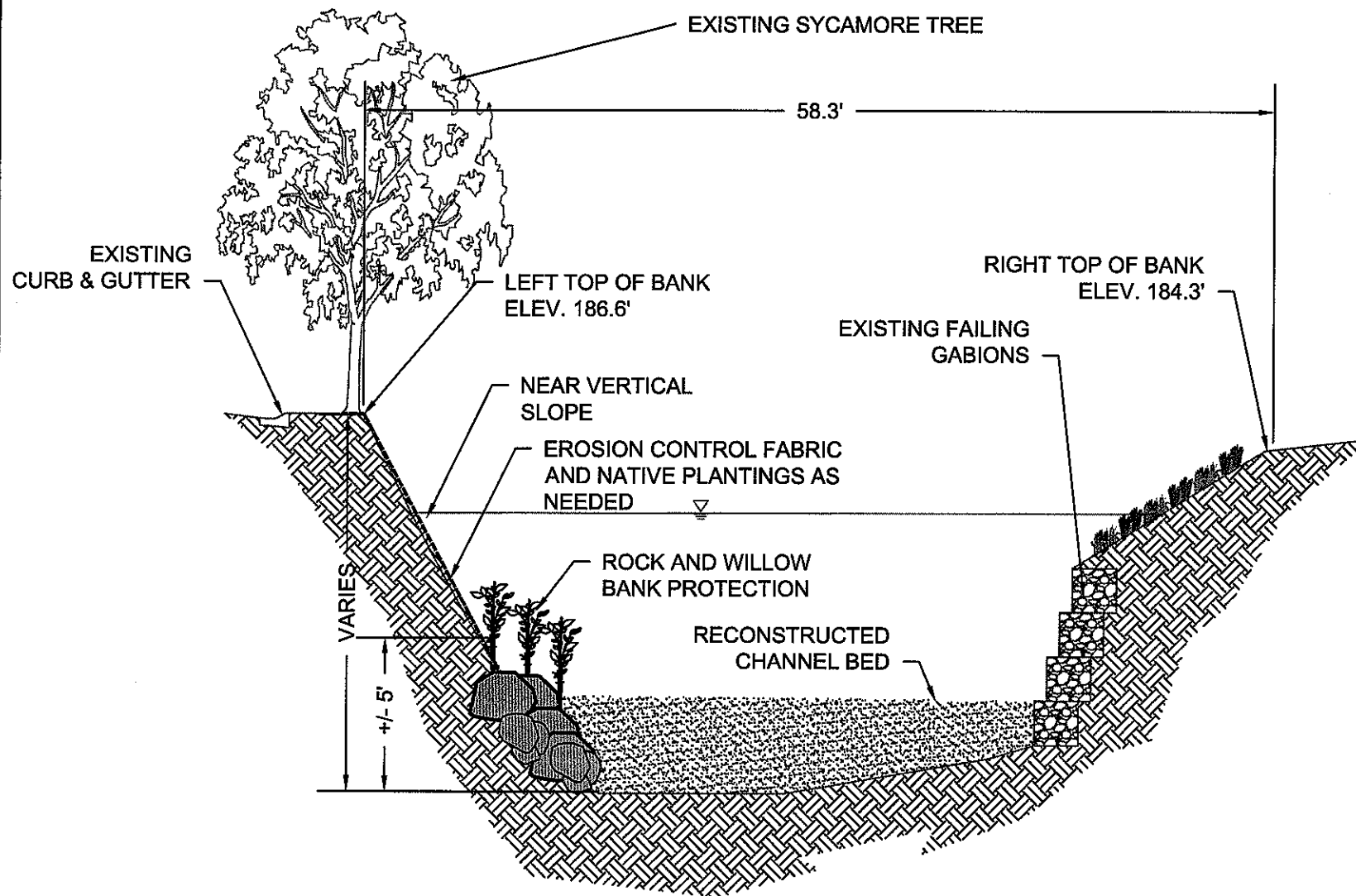
I hope this evaluation aids in the planning of a sustainable project. If you have any questions regarding the concepts or creek conditions discussed above, please do not hesitate to contact me at (510) 236-6114 ext. 220 or by email stemple@questaec.com.

Sincerely,

Sydney Temple P.E.
Principal

Attachments; Figures 2-7; hydraulic analysis summary

Ref. 250228site evaluation and plan.doc



**TYPICAL SECTION BETWEEN GRADE
CONTROL LOOKING DOWNSTREAM**

NOT TO SCALE

Date: 3/10/2006
 Drawn: C.H.H.
 Appr'd: S.T.
 Dwg. No: 250228-HC-Basemap.dwg

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**ARROYO BURRO CREEK
 PROPOSED SECTION
 HITCHCOCK CENTER
 SANTA BARBARA, CALIFORNIA**

**FIGURE
 7**

DETERMINE THE CHANGE IN WATER SURFACE ELEVATION WITH CUESTA-PROPOSED IMPROVEMENTS

Return Event: 1 percent or 100 year

Channel Bottom Grades					
X-Section Station	Distance	NAVD88	NGVD29	NGVD29	NAVD88
		FEMA Existing Elevation	Questa Existing Elevation	Proposed Elevation	Proposed Elevation
17845			163.88	163.88	166.53
	126				
17971		164.23	164.6	166.4181	169.0681
	169				
18140		167	165.7	169.8223	172.4723
	65				
18205		168	166.2	171.1317	173.7817
	32				
18237		169	167.8	171.7763	174.4263
	19				
18256		171	170	172.159	174.809
	7				
18263		175	172.3	172.3	174.95

Distance 418 Slope: 0.020144

Water Surface Grades				NGVD		Comment
X-Section Station	NAVD	NAVD	Difference	FEMA Effective	NGVD Proposed	
	FEMA WSE	WSE				
17739	176.80	176.8	-	174.15	174.15	
17845	177.51	176.7	(0.81)	174.86	174.05	
17971	178.36	179.86	1.50	175.71	177.21	Section J
18140	183.59	185.73	2.14	180.94	183.08	
18205	184.63	186.68	2.05	181.98	184.03	
18237	185.25	187.25	2.00	182.60	184.6	
18256	185.11	187.23	2.12	182.46	184.58	
18263	184.01	186.07	2.06	181.36	183.42	DS of State Street Culvert
18563	192.48	192.48	-	189.83	189.83	US of State Street Culvert
18593	194.72	194.72	-	192.07	192.07	
18703	194.58	194.58	-	191.93	191.93	

Note: Proposed condition includes increasing surface roughness to Manning's n = 0.060.
Proposed grades per Figure 4 of Questa report.

Conversion factor from NAVD88 to NGVD29

Output Window

Point 1 of 1 - Arroyo Barro

Input

Datum(s): NAD83 / NGVD29

Output

Datum(s): NAD83 / NAVD88

Vert. Units: U.S. Survey Feet

Latitude: 34 26 22.88400

Longitude: 119 44 43.78000

Elevation: 0.00000

Vert. Units: U.S. Survey Feet

Latitude: 34 26 22.88400

Longitude: 119 44 43.78000

Elevation: 2.65

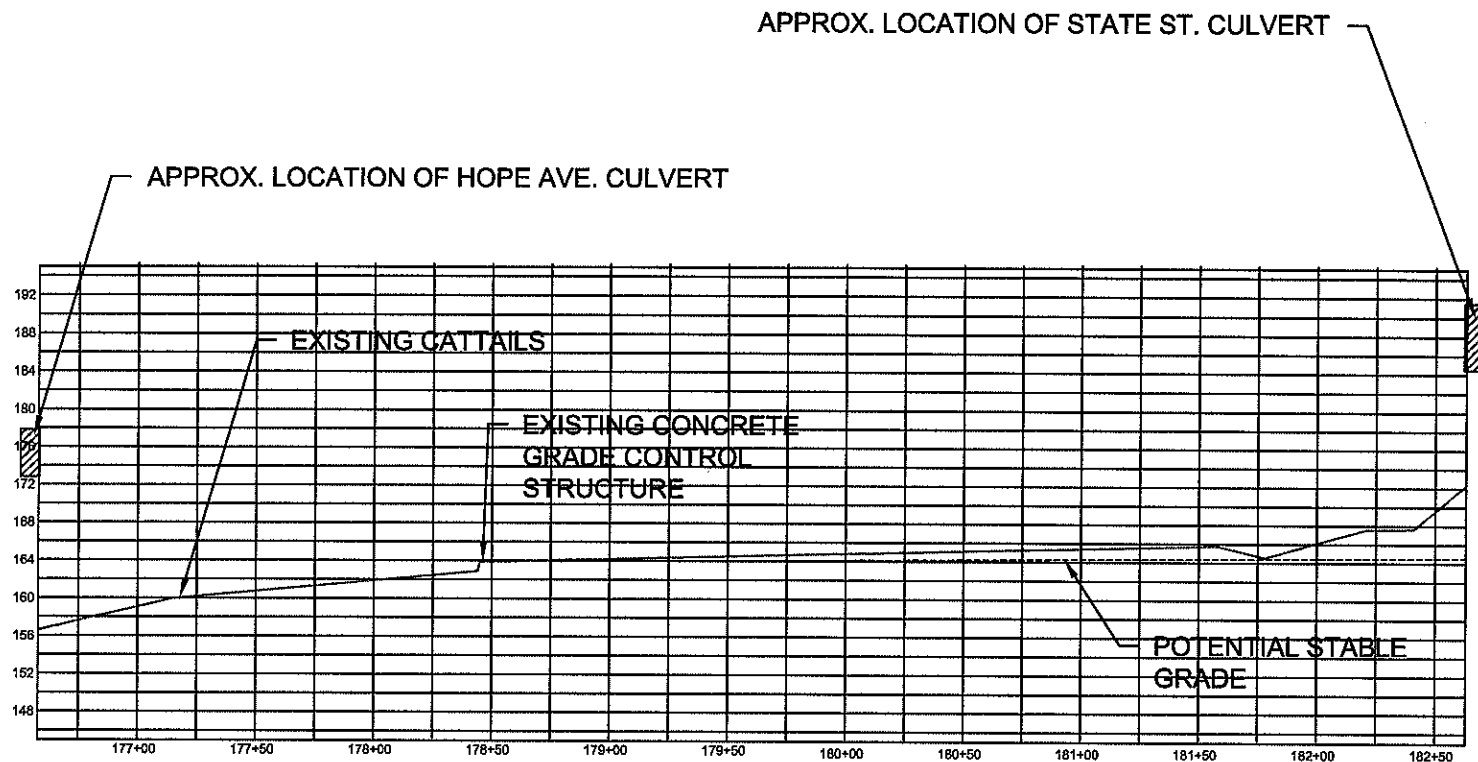
Done

FINDINGS:

1. No increase in the 100-year flood elevation upstream of State Street culvert
2. Increases downstream of State Street culvert maintain at least a 2 ft freeboard to creek bank.
3. Decrease shown at Station 17845 is due to interpolated effective section (Section 17845 was not modelled in the Effective Run but was in the Proposed Run).
4. LOMR could likely be processed successfully through FEMA with support from City and adjacent property owners.

RECOMMENDATIONS:

1. Contact adjacent property owners for support
2. Contact City for support
3. Contact County for review and concurrence
4. Contact Fish and Game for support
5. Begin processing LOMR



PROFILE OF ARROYO BURRO CREEK

SCALE: HORIZ.: 1"=80'; VERT.: 1"=20'

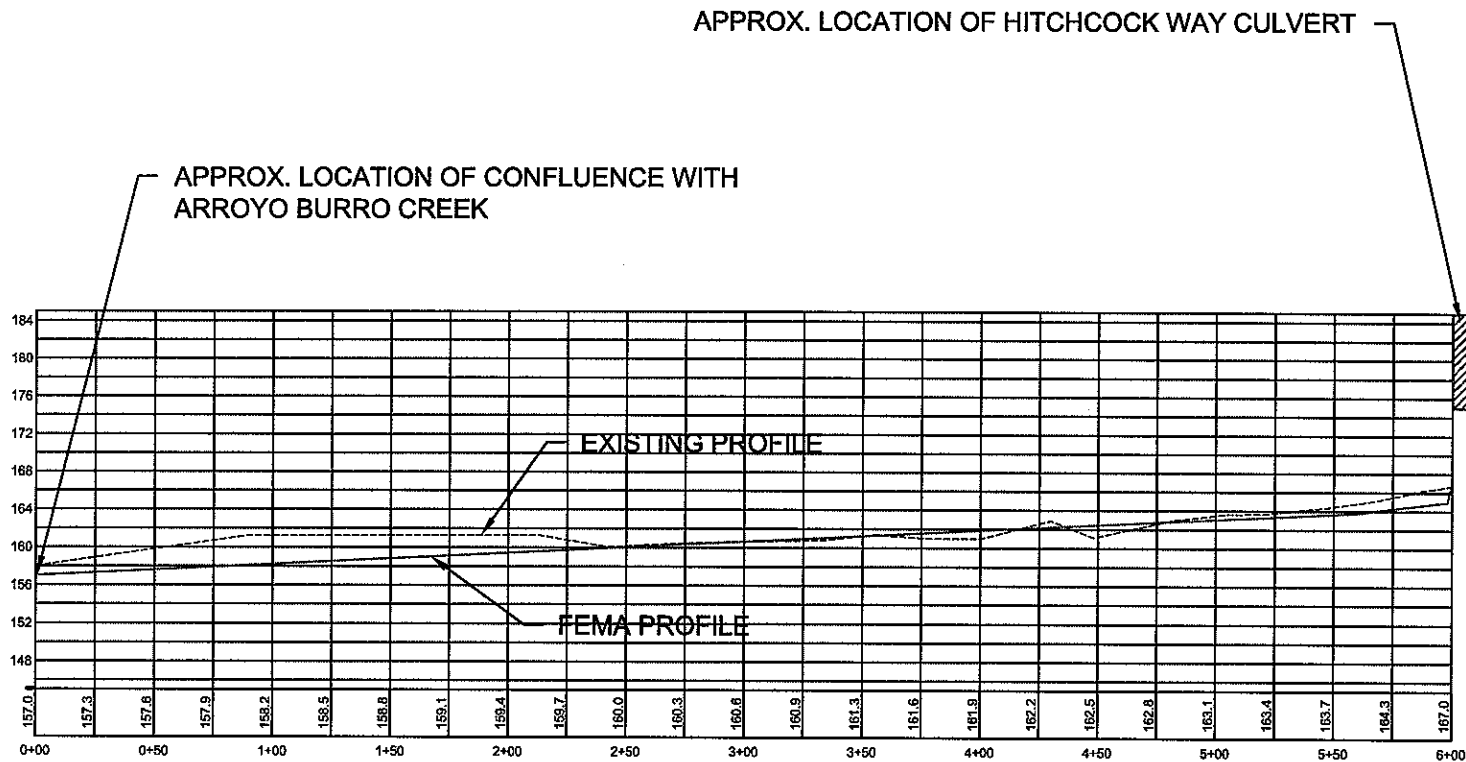
Date: 3/10/2006
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**ARROYO BURRO CREEK
 STREAMBED PROFILE ANALYSIS
 HITCHCOCK CENTER
 SANTA BARBARA, CALIFORNIA**

FIGURE

2



PROFILE OF SAN ROQUE CREEK

SCALE: HORIZ.: 1"=80'; VERT.: 1"=20'

Date: 3/10/2006

Drawn: C.H.H.

Appr'd: S.T.

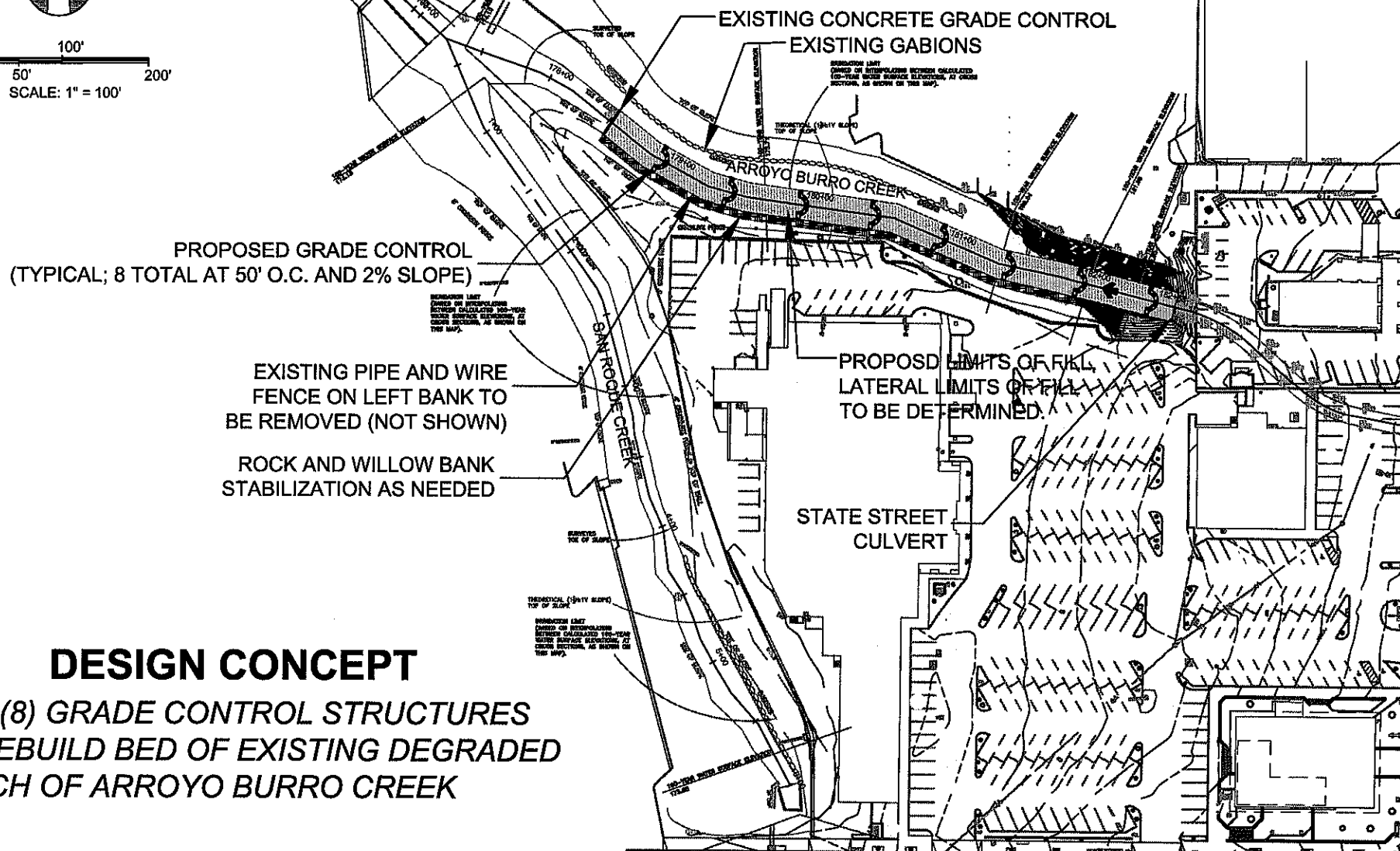
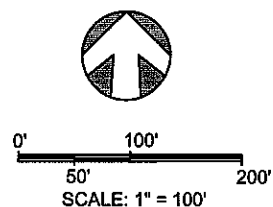
Dwg. No: 250228-HC-Basemap.dwg

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**SAN ROQUE CREEK
 STREAMBED PROFILE ANALYSIS
 HITCHCOCK CENTER
 SANTA BARBARA, CALIFORNIA**

FIGURE

3



DESIGN CONCEPT

ADD (8) GRADE CONTROL STRUCTURES
TO REBUILD BED OF EXISTING DEGRADED
REACH OF ARROYO BURRO CREEK

Date: 3/10/2006

Drawn: R.A.B.

Appr'd: S.T.

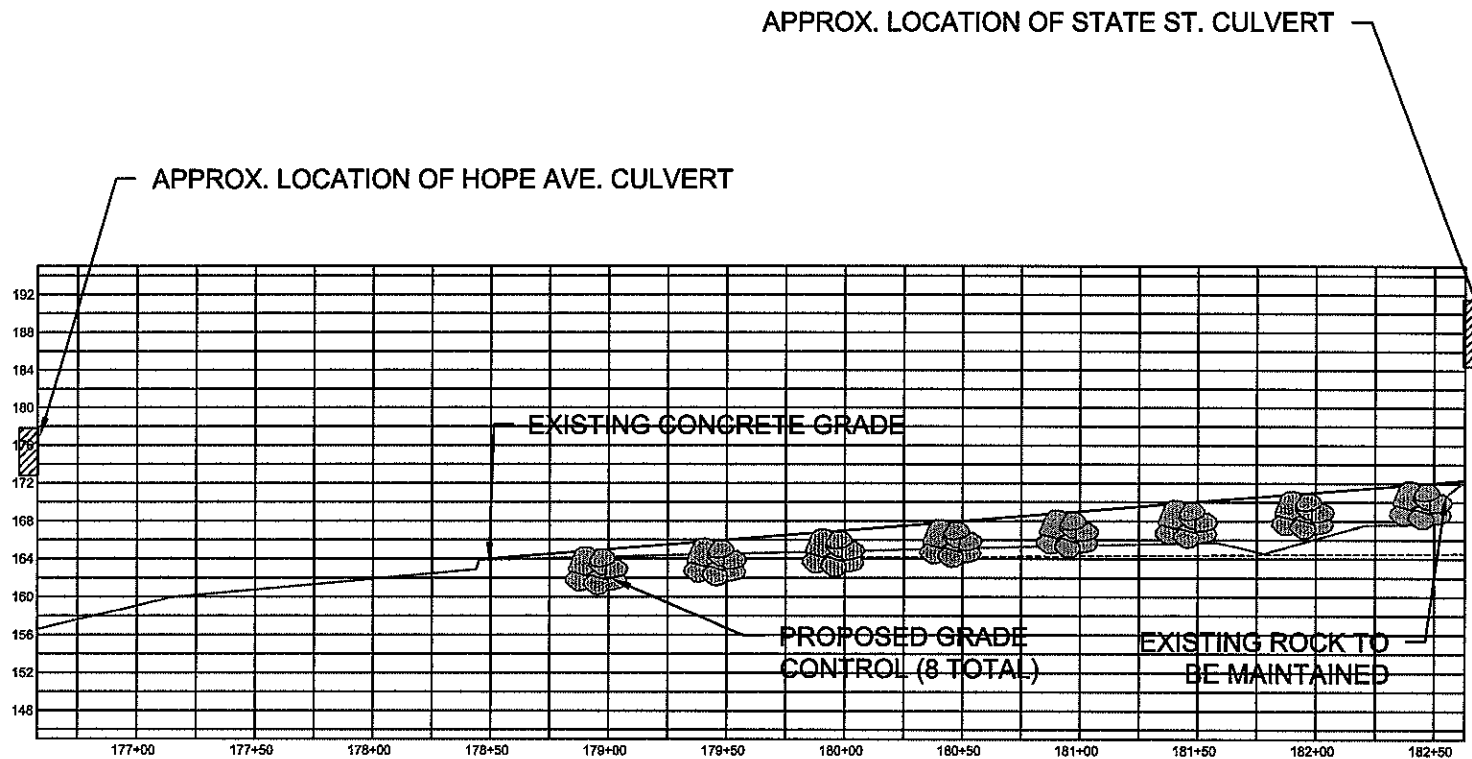
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CONCEPTUAL SITE PLAN
HITCHCOCK PLAZA
SANTA BARBARA, CALIFORNIA

FIGURE

4



PROFILE OF ARROYO BURRO CREEK

SCALE: HORIZ.: 1"=80'; VERT.: 1"=20'

GRADE CONTROL NOTES:

1. GRADE CONTROL TO BE SET AT 50 FEET APART TO ACHIEVE 12" MAXIMUM DROP PER NOAA FISHERIES.
2. GRADE CONTROL WIDTHS MAY RANGE FROM 6 TO 8 FEET.
3. TO CONSIST OF 1-2 TON ROCK AND 30% MIXTURE OF 3-6" CRUSHED STONE.
4. TO BE KEYED VERTICALLY AND Laterally A MINIMUM OF 5 FEET OR TO REFUSAL.

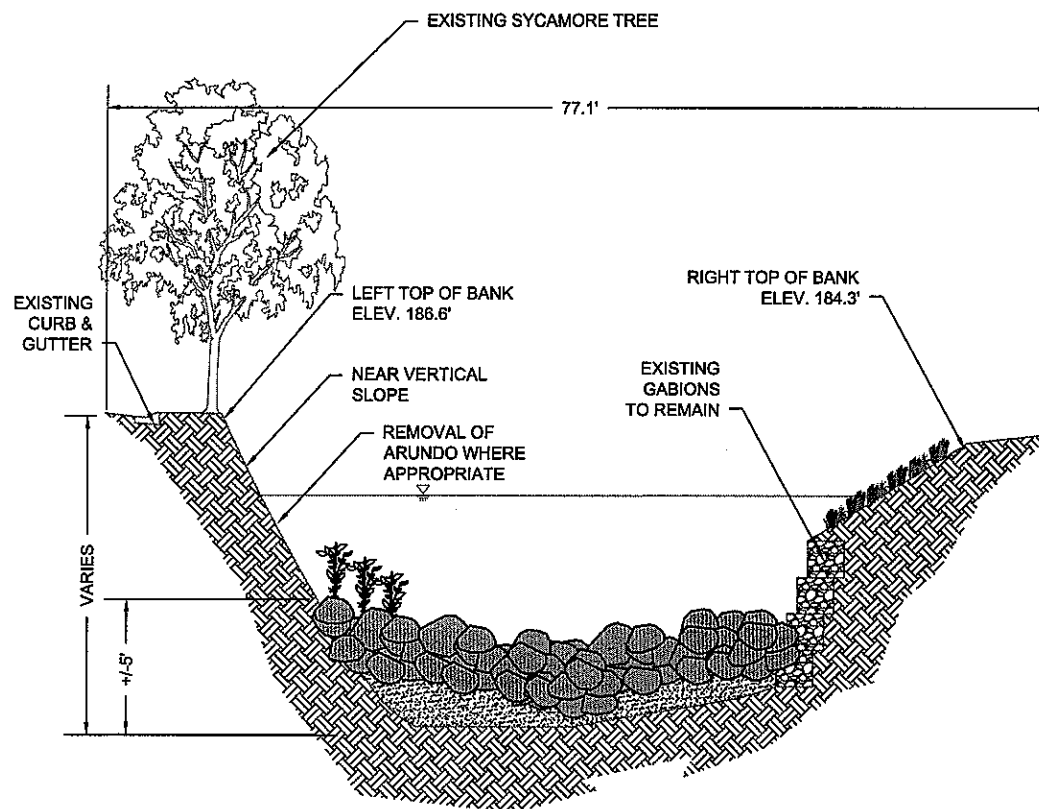
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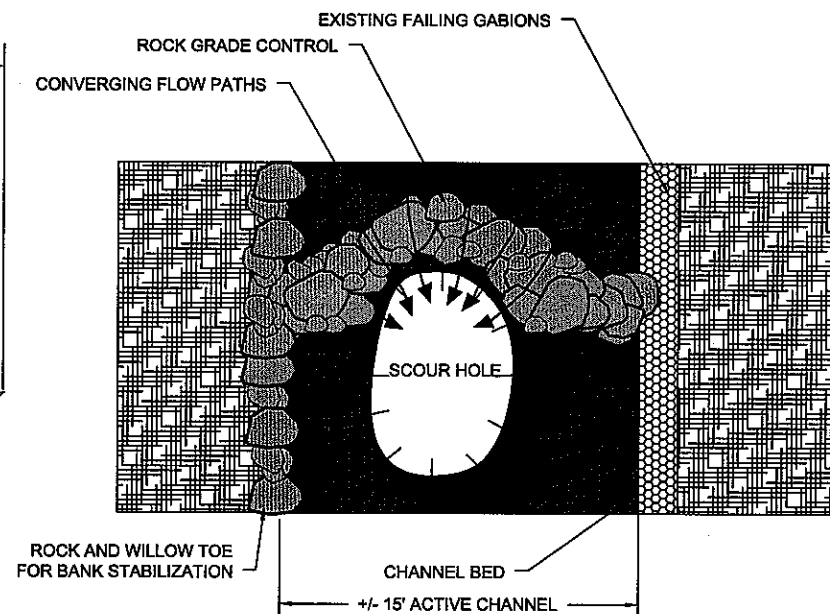
**ARROYO BURRO CREEK
 PROPOSED PROFILE
 HITCHCOCK CENTER
 SANTA BARBARA, CALIFORNIA**

FIGURE

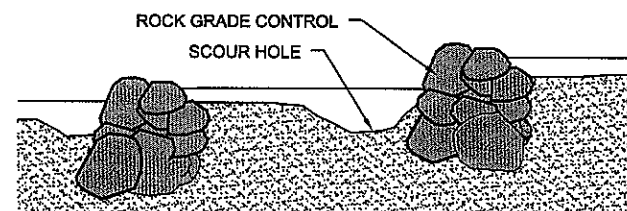
5



STA 171+00 LOOKING DOWNSTREAM
NOT TO SCALE



PLAN VIEW OF GRADE CONTROL
NOT TO SCALE



TYPICAL PROFILE
NOT TO SCALE

- NOTES:**
1. GRADE CONTROL STRUCTURE TO CONSIST OF 1-2 TON ROCK AND 30% MIXTURE OF 3-6" CRUSHED STONE.
 2. GRADE CONTROL STRUCTURES TO BE KEYED VERTICALLY AND Laterally A MINIMUM OF 5 FEET

Date:	10/27/2004
Drawn:	C.H.H.
Apprd:	S.T.
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**ARROYO BURRO CREEK
PROPOSED SECTION
HITCHCOCK CENTER
SANTA BARBARA, CALIFORNIA**

**FIGURE
6**